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distribution of each species. This work can be performed without any expensive equipment; good judgment and hard work in the field are the main requirements.

There is pressing need that the work of describing the biotic areas and habitats of the world should be speedily done. Through the influence of man's industrial activities the natural conditions of the world are rapidly passing, and in our more settled districts it is now difficult or impossible to find even small areas of the original habitats. It is important to determine quickly the habitat preferences of the native plants and animals, for these can surely be determined only in natural habitats. With the changes due to the presence of man numerous species have been introduced, others have greatly changed their abundance, and the whole balance of nature has been upset. It behooves us to record all we can of natural habitats and habitat preferences before it is too late.

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THE MOST NORTHERLY RECORD OF THE CAPTURE IN ATLANTIC WATERS OF THE UNITED STATES OF THE GIANT RAY, MANTA BIROSTRIS

LIKE many other ichthyologists I have long known that Manta drifts north with the Gulf Stream as far as Cape Lookout, North Carolina, where it is sometimes found in the Bight of the Cape or playing over the shoals which extend some 15 or 20 miles out to sea. Furthermore, I have presumed that it occasionally drifted further north, but until my attention was called to the matter recently I did not know that any scientific records of its occurrence north of that point had ever been made. However, as a matter of fact the earliest record of the occurrence of this gigantic ray in our waters is found in Lawson's voyage to

North Carolina (1709)¹. Lawson describes the "devil-fish" as shaped like a "scate," of great size, and having a very large pair of horns on its head. He notes its occurrence in the inlets of the great sandy bars separating the ocean from the sounds.

The next notice is found in Marc Catesby's "Account of Carolina and the Bahama Islands," an appendix to Vol. 2 of his "Natural History of Carolina, Florida, and the Bahama Islands, etc." 2 vols. London, 1743. Speaking of "*Diabolus marinus*, the devil-fish," which he says is a great ray having two horns on its head, he describes how one came afoul of the cable of "a sloop of 80 tons," in the harbor of Charleston, South Carolina, and dragged it about the harbor.

The first scientific record of the capture of the fish, with a careful description and excellent figures dates in the year 1824. In August, 1822, there was captured near the mouth of the Delaware Bay a specimen which was brought to Philadelphia and secured for the Academy of Natural Sciences. It was figured and described by LeSueur² in 1824. It was 15 or 16 feet wide, and 7 feet, 9 or 10 inches long without the tail (which LeSueur says was slightly over 8 feet long) and had a mouth 2½ feet wide. He described it under the name *Cephalopterus*, head-winged.

It seems to have been a matter of general knowledge at that time among the fishermen of Capes May and Henlopen that this gigantic ray occurred in the ocean off that region. At any rate, it is recorded that late in August, 1823, a crew of fishermen set out to capture one of the fishes, and that on September 9 they brought a specimen to New York. Here it was measured and described by Dr. S. L. Mitchill who published his account in the same year with LeSueur, 1824.³ It was a record

² Le Sueur, Description of several species of the genus *Raia*, of North America, *Journal Academy Natural Sciences*, Philadelphia, 1824, Vol. 4, pp. 115-121, 4 figs.

³ Mitchill, S. L., Description of a new and gigantic species of the genus *Cephalopterus* of Dumeril, *Annals Lyceum Natural History*, New York, 1824, Vol. 6, pp. 23-29, 2 figs.

¹ Lawson, John, "A new voyage to Carolina; containing the . . . natural history of that country, etc." London, 1709.

specimen, measuring 16 feet from tip to tip of pectorals, 10 feet, 9 inches from tip of head to root of tail, 17 feet, 3 inches over all (from tip of extended cephalic fins to tip of tail), and the widest part of the mouth cavity measured 3 feet, 9 inches along the curve. Mitchill calls this ray, *Cephalopterus vampyrus*, the oceanic vampire.

The next record was made by Mr. Henry W. Fowler⁴, Curator of Fishes of the Academy of Natural Sciences of Philadelphia, in 1903. This specimen was taken in a pound net located about one mile out at sea off Stone Harbor, New Jersey, on September 1, 1903. Mr. Fowler saw only the parts brought to him and hence could give no measurements.

Until this writing, this has constituted our most northerly record in the United States of the capture of Manta. However, during the last week in August of this year, a crew of swordfish fishermen were cruising off Block Island when the man in the "pulpit" saw some great flat animal swimming under him. He quickly threw his harpoon into it and after a fight which lasted over three hours, the great ray succumbed and was towed into Block Island. Fortunately there was at Block Island at this time an expert photographer, Mrs. Florence E. Foster of this city, who was engaged in making moving picture films of swordfish fishing. She took a number of excellent pictures of this specimen of Manta, particularly of its gigantic mouth. One of these shows a sucking fish clinging to the inside of the upper jaw. Mrs. Foster has very kindly presented to the department of ichthyology of the American Museum a set of these photographs which are unique of their kind.

This fish is said to have been 14 feet wide between tip of the pectorals, and 7 feet long from head to base of tail, and to have weighed on the scales 1,686 pounds. It is the only specimen known to me that has been actually weighed, and it is significant that the weight runs far less than the "estimates" usually made of from 2 to 5 tons. The record width is

said to be about 25 feet and the weight 10,000 pounds, but this has not been verified.

Another point of interest may be noted. The newspaper accounts say that there was a large spine or "sting" on the tail. Mrs. Foster did not see this but saw a wound on the tail near the base where a spine was said to have been torn off. There is much controversy among ichthyologists as to whether Manta is spined or spineless. The late Theodore Gill, the dean of American ichthyologists, once expressed to the writer his doubt as to whether Manta has a spine, and Jordan and Evermann in their "Fishes of North and Middle America" doubtfully give it a spine. However, LeSueur definitely says that both his (female) specimen and her foetus had spines, and his figure shows the spine. Mitchill found no spine, but noted "a hump or knob, about the size of a hen's egg, at the root of the tail behind the dorsal fin." In this hump Holmes⁵ found and figured a bone which seems to be either a rudimentary or a degenerate spine. This is an interesting matter and one deserving of further study.

It now remains only to call attention to the two localities where these giants abound and in which they have been taken in large numbers. The first and longest known is the harbor of Beaufort, South Carolina, made famous by William Elliott's classic work, "Carolina sports, by land and water; including incidents of devil-fishing, etc.", the first edition of which is dated Charleston (S. C.), 1846; the second, New York, 1850; the third, New York, 1859; and an English reprint of this, London, 1867. No more delightful book of its kind has ever been published.

The other locality is Captiva Inlet on the southwest coast of Florida where Dr. Russell J. Coles⁶ operated extensively in 1909, 1914

⁵ Holmes, F. S., Contributions to the natural history of the American devil-fish, etc., *Proceedings Elliott Society of Natural History*, 1856, Vol. 1: 39-46, 3 figs.

⁶ Coles, Russell J., My fight with the devilfish. *American Museum Journal*, 1916, Vol. 16, pp. 217-227, 7 figs.—Natural history notes on the devilfish, *Manta birostris* (Walbaum) and *Mobula olfersi* (Müller), *Bulletin American Museum Natural History*, 1916, Vol. 35, pp. 649-657, 5 figs.

⁴ Fowler, H. W., The occurrence of three interesting fishes on the New Jersey coast, *SCIENCE*, 1903, N. S. Vol. 17, pp. 595-596.

and 1915. During this last year Dr. Coles took a female specimen 18 feet wide, cut it up into segments of which he made plaster casts, and sent material and casts to the American Museum. From these Mr. J. C. Bell of our department of preparation made the life-sized cast which is one of the chief prizes of our Fish Hall.

The most complete account of the natural history of Manta is contained in an article by Dr. Theodore Gill, "The story of the devil-fish." *Smithsonian Miscellaneous Collections*, 1908, vol. 52, pp. 155-180. 15 figs.

AMERICAN MUSEUM OF
NATURAL HISTORY

E. W. GUDGER

JOHN CASPER BRANNER

JOHN CASPER BRANNER, geologist and President Emeritus of Stanford University, was born in New Market, East Tennessee, July 4, 1850, and died in Palo Alto, California, on March 1, 1922. He entered Cornell University in 1870, soon after its organization, graduating in 1874 as Bachelor of Science, subsequently receiving the degree of Ph. D. from Indiana University and that of LL. D. from the University of California. In 1883 he married Susan D. Kennedy of Oneida, New York, and left three children: John K., architect, George C., geologist-philosopher, and Elsie, Mrs. Frederick Hall Fowler.

His advanced work at Cornell was under a great teacher of Geology, Charles Frederick Hartt, who (during vacations) acted as Imperial Geologist of Brazil. Thus with Orville A. Derby, Richard Rathbun, Herbert H. Smith, and other student assistants, Branner went to Brazil where, upon the death of Hartt in 1875, he became director of the Imperial Geological Commission. Afterward, Brazil having become a republic, he entered the service of the Sao Cyriaco Mining Company at Minas Geraes as engineer and interpreter. Later he again went to Brazil and to Argentina as special botanist for Thomas A. Edison in search of wood fitted for certain electrical uses, and still later represented the United States Department of Agriculture in the former country. Return-

ing to America in 1883, he served as topographical geologist of the Survey of Pennsylvania, a position resigned to accept that of professor of geology in the University of Indiana, where his college friend, the present writer, had just been appointed President. In 1891, he entered the faculty of the newly founded Stanford University as professor of geology, later becoming vice-president of the institution. In 1913 when the title of Chancellor was created for me that I might be free for public service, he was elected President of the University, and held that office up to his retirement as Emeritus in 1917.

Branner directed three scientific expeditions to Brazil: one under the patronage of Alexander Agassiz in 1899, one in 1907 supported by Richard A. F. Penrose, a former assistant professor at Stanford, and a third in 1911 for the Brazilian government. This last made a geological and biological study of the coast north and south of the mouth of the Amazon river, the especial purpose being to determine the effect of the great volume of fresh water brought into the ocean by the Amazon upon the marine life of the ocean.

His publications include a volume on the Geology of Brazil, with a large number of special papers, and a grammar of the Portuguese language. His other memoirs on Geology and Physical Geography are very numerous; his "Bibliography of Clays and Arts" is an important contribution to that subject.

Branner was a fellow of the Geological Society of America, a member of the Geological Society of London, of the Société Géologique de France, the National Academy of Sciences, the American Philosophical Society. He was also a member and for a time president of the American Seismological Society, and associate editor of the *Journal of Geology*. In 1906 he was appointed to the California Earthquake Commission, and in 1915 served the United States government on the commission to investigate the land slides on the Panama Canal.

In 1911 the Hayden Medal was conferred upon him by the Academy of Natural Science of Philadelphia "in recognition of the value of contributions to geological science, and of